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Original Article

Study of atracurium and tramadol or ketorolac as an adjunct to low dose lignocaine in intravenous regional anesthesia

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ABSTRACT

Background: Purpose of the study was to evaluate the efficacy of Atracurium as adjuvant with tramadol or Ketorolac in reducing the dose of lignocaine used for intravenous regional anesthesia thereby decreasing the chances of systemic toxicity of lignocaine. **Patients and Methods:** The study was done in Department of Anaesthesia, Santhiram Medical College and General Hospital, Nandyal. 75 adult patients of ASA grade I and II were divided into three equal groups of twenty each in randomized double blind manner. Group I patients received 40ml of 0.5% lignocaine. Group II and III received 40 ml of 0.25% lignocaine with addition of 2 mg Atracurium and 50 mg tramadol while in Group III, tramadol was replaced with 30 mg of Ketorolac. Onset of sensory and motor block, intraoperative degree of analgesia, intraoperative and postoperative complications were recorded in all the three groups. **Results:** There was no significant difference between the groups with respect to age, weight and sex distribution. Mean time of onset of motor block in group I, II and III was statistically significant ($p < 0.001$). Mean time of onset of sensory block in groups I, II and III was also statistically significant. Intraoperative degree of analgesia in group II and III was comparable to group I. **Conclusions:** The use of 0.25% lignocaine and Atracurium with tramadol or Ketorolac provides comparable analgesia to 0.5% lignocaine used alone. This decreases the concentration and total dose of lignocaine required but delays the onset of both sensory and motor block.

Keywords: Intravenous regional anesthesia, Lignocaine, Ketorolac, Tramadol, Atracurium

INTRODUCTION

Intravenous regional anesthesia (IVRA) is a simple, reliable and safe local anesthetic technique [1]. It is ideal for short operative procedures on the extremities. It provides the patients a favorable recovery profile expedites the post-anesthesia care unit and hospital discharge, thereby, reducing the cost. Its limitations include the slow onset, tourniquet pain and minimal post-operative analgesia [2].

Adjuncts to local anesthetics for IVRA have been proposed to enhance the quality of anesthesia, tourniquet tolerance and postoperative analgesia [3]. Tramadol is a synthetic opioid that has central analgesic effects as the result of its monoaminergic and mu-receptor agonistic activity [4]. In addition, it exhibits peripheral local anesthetic properties [5]. To have a good and prolonged analgesia with the same strength of lignocaine, different methods have been proposed like alkalization of local anaesthetics[6], addition of an opoiod [7], muscle relaxant or a NSAID [8,9]. AIM OF STUDY: To evaluate the efficacy of adding Atracurium with tramadol or ketorolac when lignocaine concentration is reduced to 0.25% from conventional 0.5% used for intravenous regional anesthesia.

PATIENTS AND METHODS

The study was done in Department of Anaesthesia, Santhiram Medical College and General Hospital, Nandyal. After obtaining informed consent and approval from the local ethics committee, this study was conducted in 75 ASA I and II patients with age group 20-60 yrs of either sex, scheduled for elective surgery on forearm and hand. Patients treated with opioids, patients with acid peptic disorder, coagulation disorder, patients with hypersensitivity to LA and NSAID's were excluded from the study. These sixty patients were

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randomly divided into 3 equal groups using computer generated random number list so as to receive one of the following solutions in a double blind fashion. Group I – 40 ml of 0.5% lignocaine (200 mg) Group II – 0.25% lignocaine (100 mg) + 50 mg Tramadol + 2 mg Atracurium diluted in normal saline to make total volume of 40 ml Group III – 0.25% lignocaine (100 mg) + 30 mg Ketorolac + 2 mg Atracurium diluted in normal saline to make total volume of 40 ml.

Pre-anesthetic Preparation: All the patients were kept nil per oral for about eight hours and were pre-medicated with Tab. Midazolam 7.5 mg at bed time and in the morning of surgery. Baseline records for B.P., R.R., SPO2 and Pulse rate were noted.

Anaesthetic Technique: In the operation theatre one IV line was set up in the non-operative limb. In the operative limb, a 22G intravenous cannula was inserted in the most distal vein. Patient was then shifted to operating table and was connected to the non-invasive monitors for getting continuous record of E.C.G, B.P. and SPO2. A double tourniquet was positioned on the upper operative arm with the purpose of eliminating the tourniquet pain and patient comfort. Exsanguination of the limb was done by application of esmarch bandage. In case of painful limb where exsanguinations could not be carried out, limb elevation was given for five minutes. Proximal tourniquet was inflated 100 mmHg above the systolic B.P. of patient. 40 ml of study drug was then given over a period of 1 minute. Once the patient felt uneasiness at proximal tourniquet site or after twenty minutes, whichever was later the distal tourniquet was inflated to the same pressure and the proximal cuff was deflated. The surgery was allowed to proceed once the block was complete. In case of incomplete or partial block, supplemental GA was given and the tourniquet was released only after 40 minutes and the patient was excluded from the study. Onset of sensory block [10] was assessed by response to pinprick at 1 minute interval.

0 - Sharp 1 - Touch only 2 - Cannot feel touch

Score 2 was taken as onset of complete sensory block.

Onset of motor block [10] – The motor block was assessed according to following scale:

0 - able to move arm against resistance 1 - Inability to move wrist against resistance 2 - Inability to move wrist and elbow against resistance 3 - Inability to move the arm against resistance

Score 3 was taken as onset of complete motor block. Intraoperative degree of analgesia was evaluated by VAS on 0-10 cm scale. Complications if any were reported intra and postoperatively.

RESULTS

All the three groups were comparable regarding their demographic data (age, sex and weight). Tendon repair was most commonly performed operation (23) followed by open reduction and nailing (15), implant removal (10) Nerve exploration (7) and contracture release (5). Figure 1 shows the mean time of onset of sensory block in group I, II and III. There was statistically significant difference between group I & II, group I & III and group II & III in the meantime of onset of sensory block. Figure 2 shows the mean time of onset of motor block in group I, II and III. There was statistically significant difference between group I & II, group I & III and group II & III in the meantime of onset of motor block. Both the onset of sensory and motor block was delayed in group II and III as compared to group I ($t - stat > 2.64$) Figure 3 shows the VAS score at 10 min, 20 min, 30 min, 40 min, and 50 min in Group I, II and III. Statistically the difference in VAS score in these three groups using ANOVA test was found to be significant ($P < 0.001$). Statistically the difference in VAS was found insignificant between group I & II at 10, 20, 30, 40 and 50 min ($t\text{-stat} < 2.64$). In group I and III and group II and III the difference in VAS score at 10, 20, 30, 40 and 50 min was found to be statistically significant ($t\text{-stat} > 2.64$). Two patients in group I experienced dizziness post operatively after release of tourniquet. Two patients in group II had skin rash distal to the tourniquet which faded half an hour after release of tourniquet. Three patients had to be supplemented with general anesthesia and were excluded from the study.

Table 1 – Comparison of demographic profile of patients Sex Male Female

	Age Mean (yrs)	Male	Female	Weight (kg)
Group 1	34.35+ 4.77	7	18	58.2 + 3.05
Group 2	33.95 + 6.01	7	18	55.47 + 3.42
Group 3	34.85 + 6.19	8	17	57.15 + 3.36

Table 2 – Comparison of surgical procedures and duration of surgery Surgical Procedures

	Group 1	Group 2	Group 3
Tendon repair	10	9	12
Open reduction and nailing (Hand and finger)	7	6	5
Implant removal	4	5	3
Contracture release	1	2	2
Nerve exploration	3	3	3
Duration of surgery in minutes.	46.1 + 8.19	44.33 + 4.11	43.88 + 4.22

Figure 1: Mean time of onset of sensory block

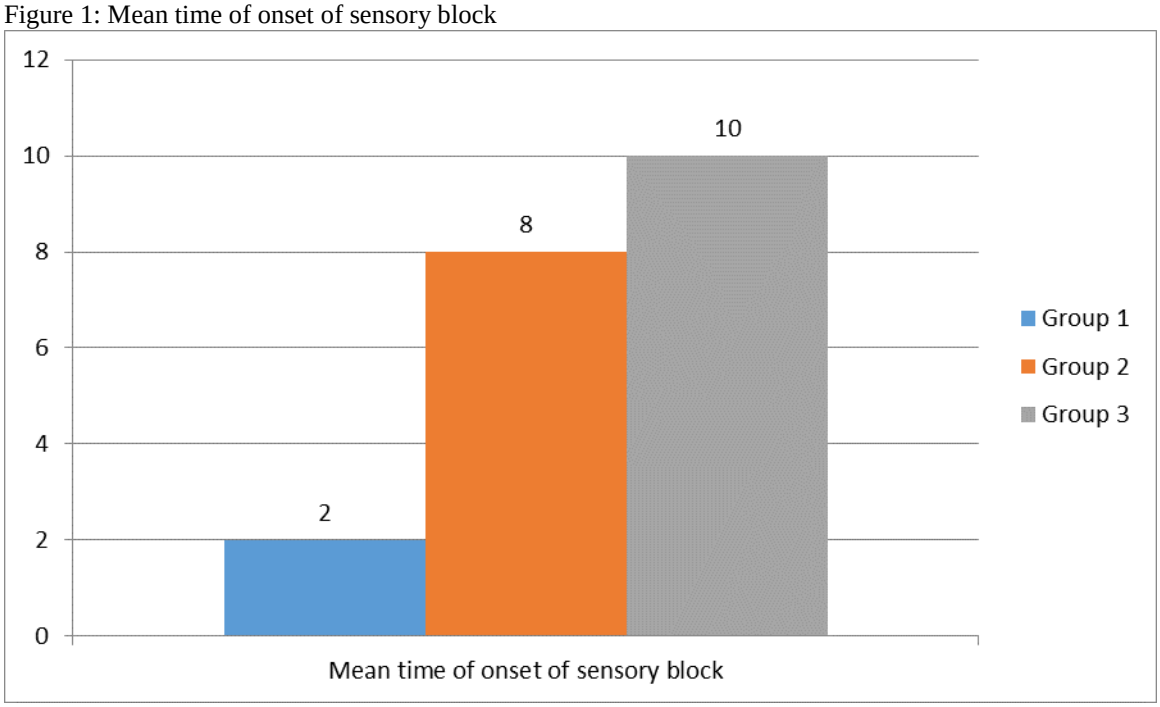


Figure 2: Mean time of onset of motor block

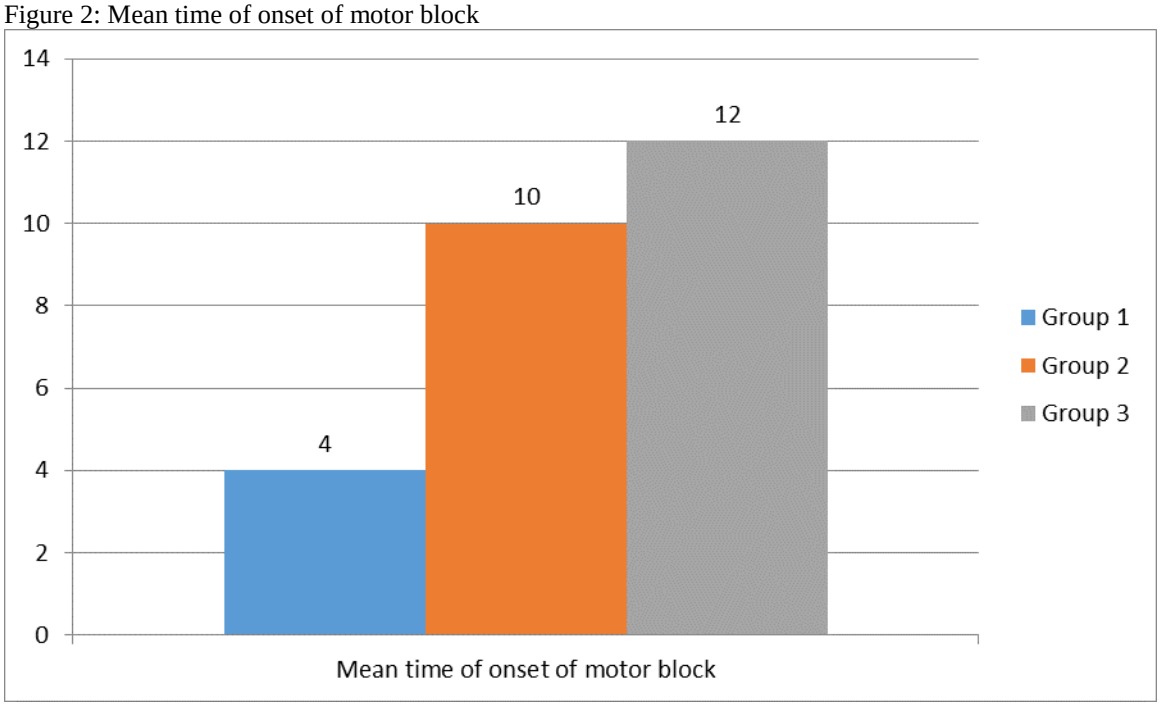
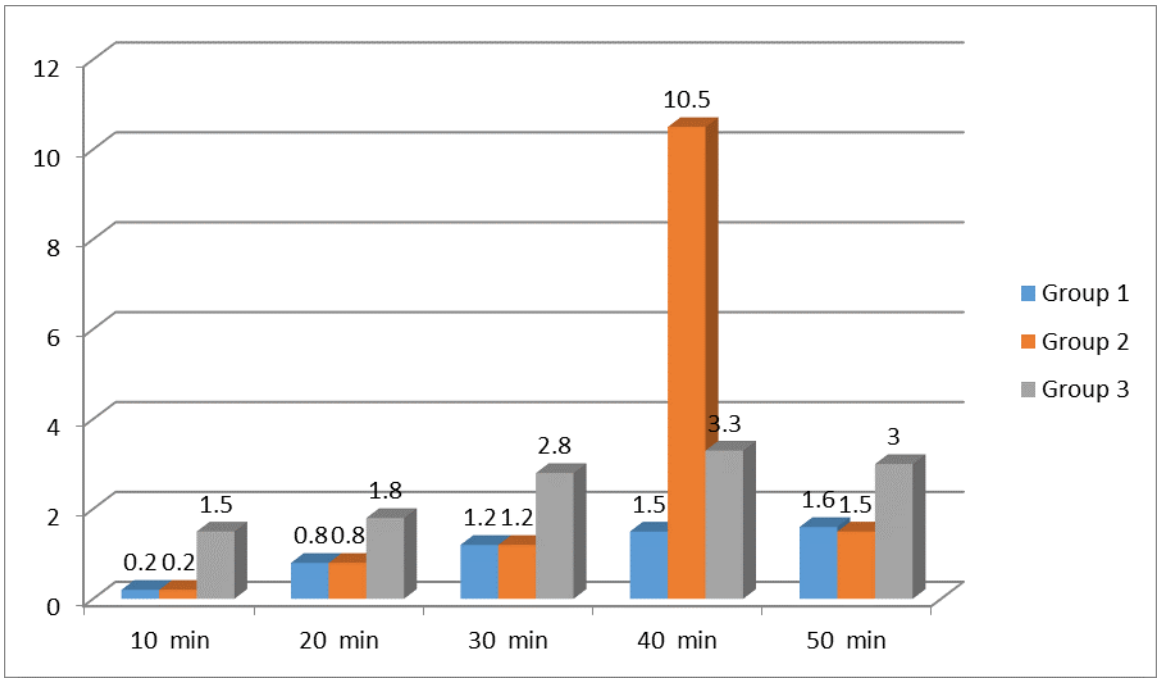


Figure 3: Intraoperative analgesia using VAS score



DISCUSSION

In our study the mean time of onset of sensory and motor block was delayed in group II and III as compared to group I. Our findings are comparable with Palecha [10] et al (2001) who observed that mean time of onset of sensory and motor block was delayed in group containing 0.25% lignocaine with pentazocine and pancuronium as compared to the group containing 0.5% lignocaine. Statistically the difference in VAS was found insignificant between group I and II at 10, 20, 30, 40 and 50 minutes. Our finding is comparable to the observations made by Sztark et al [11] who found that adding on opioid and muscle relaxant to 0.25% lignocaine reduced the dose of lignocaine to non-toxic level for the same quality of analgesia as provided by the use of 0.5% lignocaine in intravenous regional anesthesia. Statistically the difference in VAS score was significant between group I and III and group II and III (t-stat > 2.64). This is in contrary to the finding of Reuben22 et al who found that addition of 60 mg of Ketorolac of 0.5% lignocaine for intravenous regional anesthesia provided better intra-operative analgesia. Reason for getting a better outcome in intravenous regional anesthesia in this study could be use of high concentration (0.5%) of local anaesthetic combined with high dose of Ketorolac (60mg) as compared to low conc. of lignocaine (0.25%) and low dosage of Ketorolac (30mg) used in our study. Thus the addition of tramadol and Atracurium to 0.25% lignocaine provides the same quality of intraoperative analgesia as compared to 0.5% lignocaine but the combination had delayed onset of sensory and motor block. Addition of Ketorolac 30 mg and 2 mg Atracurium to 0.25% lignocaine does not provide the same quality of analgesia as compared to 0.5% lignocaine although it provides clinically acceptable surgical anaesthesia. So the use of 0.25% lignocaine with these adjuncts allows a reduction in total dose of lignocaine while achieving the same degree of intraoperative analgesia in intravenous regional anesthesia.

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